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Method for authorization of a telematics service in a motor vehicle

The invention relates to a method for authorization of a telematics service in a motor vehicle, as claimed in the precharacterizing clause of claim 1. In this case, the telematics service is provided by a mobile radio link between a telematics controller in the motor vehicle and a telematics center which is arranged outside the motor vehicle. The telematics controller also has a communication means, which can be connected at least at times without the use of wires to a further communication means, which is arranged in the telematics center. This link allows data to be transmitted and/or received by the motor vehicle.

Modern motor vehicles are increasingly being equipped with telematics services. Telematics services such as these assist the driver in critical situations, increase the driving convenience or reduce the fuel consumption, and thus the environmental pollution. Examples are an emergency call function, remote diagnosis or dynamic navigation (routing).

Before the driver can use such telematics services in the motor vehicle, a once-off authorization process must be carried out. In this case, the authorization process represents a check as to whether and if yes what telematics services the motor vehicle and/or the driver of the motor vehicle can use and/or may use. This authorization process is carried out, for example, by the telematics center. During the authorization process, data which relates in particular to the motor vehicle and/or the mobile radio link is evaluated. The telematics services cannot be used in the motor vehicle until the authorization process ("enabling") has been

successfully completed.

Methods for authorization are already known in differing forms. For example, DE 197 52 970 A1 describes a method for authorization of a communication means in a communication network. In this case, the communication means sets up a link to a control station for the communication network, and transmits the information that is required for authorization of the communication means. The authorization process can thus be carried out completely from the communication means. However, to do this, a corresponding link must be produced in the communication network. Furthermore, the required information must be provided to the communication means, before it can be used.

DE 198 16 575 discloses a method for authorization of a telematics service in a motor vehicle. In this case, the telematics service is provided using a specific, further-developed SIM card ("Subscriber Identity Module"). This specific card is first of all provided with a telephone number for the telematics center. The user then initiates an authorization process by making a request to the telematics center, for example in the form of a short message (SMS, "Short Message Service"). Together with the request, the user of the card and/or of the associated motor vehicle sends information to the telematics center. In particular, the telephone number of the card, that is to say the associated motor vehicle, is provided for the telematics center. The telematics center checks this information and then in turn produces an authorization by transmission of data, for example once again in the form of a short message. The data which is transmitted by the telematics center includes, in particular, specific electronic keys for use of the telematics service. The driver of the motor vehicle must therefore either himself initiate the authorization process, or else must look for a

workshop. In any case, the telematics service cannot be used immediately, ex-works. It is also once again necessary to set up an appropriate link in the communication network.

The invention is based on the object of specifying a low-cost simple method for authorization of a telematics service in a motor vehicle, which allows use of the telematics service ex-works and does not require a corresponding link to be set up in the communication network.

According to the invention, this object is achieved by the method having the features of claim 1. The dependent claims relate to advantageous embodiments and developments of the invention.

The main idea of the invention is that the telematics center is provided with data which identifies the motor vehicle from a first database and with data which identifies the mobile radio link from a second database and that the telematics center then uses the data that has been provided to produce the authorization automatically.

This method also has a number of advantages. For example, the telematics center links the data which identifies the motor vehicle to the data which identifies the mobile radio link as part of the authorization process. Thus, in particular, the telephone number of the associated motor vehicle in the mobile radio network is, according to the invention, known in the telematics center after successful authorization ("enabling"). This allows the telematics service to be used ex-works. The motor vehicle therefore does not need to be authorized in a workshop before being delivered to the customer. This is particularly worthwhile for vehicle-related telematics

services, such as remote diagnosis. The motor vehicle is thus complete on leaving the production works, that is to say including the telematics services that are associated with that motor vehicle. There is no need for time-consuming and costly reworking by the dealer or in a workshop.

Furthermore, this avoids the complex and expensive process, which is susceptible to errors, of the initial setting up a corresponding mobile radio link between the telematics controller and the telematics center. This interchange of data for the first time results in particular in the telematics center being provided with the telephone number of the telematics controller in the motor vehicle, and in this being stored in some suitable form. For this purpose, the vehicle must be ready to receive, at least for the duration of the authorization process. Furthermore, the individual processing and the data interchange incur corresponding costs. In addition, such radio link initialization processing is particularly susceptible to errors.

A further advantage is the reliability and security that the method according to the invention offers. Use of suitably protected databases and data transmission paths allows an authorization process which is particularly resistant to manipulation, is particularly robust and is particularly reliable. An additional advantage is evident in the situation in which telematics control in the motor vehicle is also designed to be resistant to manipulation, in a corresponding manner. In this situation, it may even be possible to dispense with the storage of electronic keys for the telematics service in the telematics controller.

Furthermore, the telephone number of the motor vehicle, that is to say the telephone number of the associated

telematics controller, is already known at an early stage in the telematics center. For example, the telephone number can be made available in the telematics center even at the start of production of the motor vehicle. This allows appropriate preparations to be taken in the telematics center at this stage.

According to the invention, there is no need to store a telephone number of the telematics center in the telematics controller in the motor vehicle. This is because the telematics center in fact "knows" the telephone number of the telematics controller in the motor vehicle after enabling and can, for example, appropriately monitor whether this telephone number has been registered in the mobile radio network. On registration, the telematics center could then send its own appropriate telephone number to the telematics controller.

This procedure is expedient, for example, in the situation where a number of telematics centers are provided, or the telephone number of a telematics center has not yet been defined.

According to the invention, any desired mobile radio networks may be provided, for example a GSM network ("Global System for Mobile Communication") - also in the form of a GPRS ("General Packet Radio System") - a UMTS network ("Universal Mobile Telephone System") or a satellite-based network. The invention is also, of course, not restricted to the use of only one network. For example, it is thus possible to provide for the simultaneous or alternate use of two or more mobile radio networks in the telematics controller, either for the transmission and/or for the reception of data. Furthermore, a combination with other communication means, for example for a WLAN ("Wide Local Area Network") is possible.

The telematics controller itself may either be in the form of a unit or may be formed from various distributed components, with these components being connected, for example, via a local area network (CAN bus, "Controlled Area Network").

A large number of options are provided for making the data from the first and the second database available in the telematics center. By way of example, a wire-based link, for example in digital form as an ISDN link, a wire-free link, for example via mobile radio or satellite, and directional radio should be mentioned here. In this case, the telematics center is not necessarily provided at a single location. By way of example, the telematics center may be in the form of a number of distributed computers ("server").

In one advantageous refinement, at least one telephone number of the telematics center is stored in the telematics controller. This results in a fully functional motor vehicle in an ideal manner, ex-works.

It is particularly advantageous for the telematics controller to hold a subscriber card for setting up the mobile radio link. One such subscriber card is the SIM card ("Subscriber Identity Module") for a GSM network. Subscriber cards such as these allow the telematics controller in the motor vehicle to be separated into a vehicle-specific part ("hardware") and a mass-produced article, that is to say the subscriber card. This advantageously makes it possible to exploit the cost and selection advantages of a mass-produced article. A subscriber card is thus fitted in the motor vehicle with each telematics controller. In this case, by way of example, it is possible to provide for the subscriber card to be permanently integrated in the telematics controller. This is advantageous from the

security and reliability points of view, and emphasizes the fact that the telematics service or services is or are an integrated component of the motor vehicle.

The use of a subscriber card results in a further use in a manner that is specific to the invention. This is because the subscriber card is offered in a simple form by suppliers such as operators or service providers of mobile radio networks. These suppliers also conveniently already store the data which identifies the mobile radio link. There is therefore no need to additionally set up the second database that is required for authorization of the telematics service according to the invention. In fact, already existing databases can be made use of, without any problem.

It is advantageously proposed that the data which is provided to the telematics center from the second database comprises at least the subscriber card identification number and the telephone number of the subscriber card that is held by the telematics controller. The subscriber card identification number (ICC-ID, "IC-Card Identification" or IMSI "International Mobile Subscriber Identity") is stored in the subscriber card during production and is unique throughout the world to each subscriber card. The subscriber cards - identification number and the telephone number of a subscriber card are provided by the supplier, together with the subscriber card. This ensures, in a particularly simple manner, unique identification of those features which identify the mobile radio link in the subscriber card that is installed in the motor vehicle, and thus the motor vehicle itself.

Every vehicle production works already has a vehicle documentation database. The data relating to the motor vehicles produced is stored in this database. For

example, each motor vehicle is allocated a chassis number, which is stored in the database. This chassis number is used for unique identification of the motor vehicle. One particularly simple embodiment therefore provides for the data which is provided to the telematics center from the first database to comprise at least the chassis number which identifies the motor vehicle and the subscriber card identification number for the subscriber card which is held by the telematics controller. For this purpose, the already existing vehicle documentation database for each motor vehicle just has to have one further entry added to it, specifically the subscriber card identification number for the subscriber card which is held by the telematics controller. This ensures unique identification of the features which identify the motor vehicle, in a particularly simple manner.

It is particularly advantageous to permanently store an access code (PIN, "Personal Identification Number"), which is required for use of the subscriber card, in the telematics controller. This prevents removal and misuse of the subscriber card.

The telematics service is particularly convenient if it is personalized by provision of the data which identifies the respective subscriber in more detail in the telematics center. Data such as this, for example the name, address and vehicle identification of the subscriber, allows individual supervision of the subscriber to the telematics service. This data is, for example, provided by the dealer who is selling the vehicle with the telematics service to the subscriber.

Two preferred embodiments of the invention will now be explained in more detail with reference to a drawing in Figure 1 and Figure 2.

Figure 1 shows a motor vehicle 1 with a telematics controller 2 having a subscriber card 3 for a mobile radio network. The motor vehicle 1 is produced by a vehicle production works 10. A supplier 20 supplies the subscriber card 3 for the mobile radio network together with the access code (PIN, "Personal Identification Number"), which is required for use of the subscriber card 3. The telematics controller 2 is installed in the vehicle 1 in the vehicle production works 10. The subscriber card 3 is likewise installed in the telematics controller 2 in the vehicle production works 10. Furthermore, the subscriber card 3 is enabled by the PIN in the vehicle production works 10, with the PIN being permanently stored in the telematics controller 2.

Figure 2 shows how the supplier 20 supplies the subscriber card 3 for the mobile radio network together with the access code (PIN, "Personal Identification Number"), which is required for use of the subscriber card 3, to a supplier 22 of the telematics controller 2. The supplier 22 installs the subscriber card 3 in the telematics controller 2. The supplier 22 then enables the subscriber card 3 by means of the PIN, with the PIN being permanently stored in the telematics controller 2. The enabled telematics controller 2 is supplied by the supplier 22 to the vehicle production works 10. The enabled telematics controller 2 is installed in the vehicle 1 in the vehicle production works 10.

The further details apply in the same sense both to Figure 1 and to Figure 2. For this reason, no further distinction will be drawn in the following text between Figure 1 and Figure 2, and the reference symbols which are used in the statements are used in both Figure 1 and Figure 2.

Since the PIN is in each case permanently stored in the telematics controller 2, this prevents removal and misuse of the subscriber card 3. Furthermore, the telematics service is immediately functional ("unpersonalized telematics service").

The vehicle production works 10 and the supplier 20 each have a respective database 11 and 21. The subscriber card identification number of the subscriber card 3 which is held by the telematics controller 2 is additionally stored in the vehicle documentation database 11, in addition to the chassis number which uniquely identifies the motor vehicle 1. At least the subscriber card identification number and the telephone number of the subscriber card 3 which has been delivered to the vehicle production works 10 and is held in the telematics controller 2 there are stored in the supplier's database 21.

At the start of production, the scope of the telematics service to be authorized in the motor vehicle 1 is defined. Once the motor vehicle 1 has been produced, this telematics service is provided by a mobile radio link between the telematics controller 2 and an external telematics center 30.

The telematics center 30 is then provided from the vehicle documentation database 11 with the chassis number, which uniquely identifies the motor vehicle 1, the subscriber card identification number of the subscriber card 3 which is to be installed in the telematics controller 2, and information about the scope of the telematics service to be authorized in the motor vehicle 1, via an ISDN line. The subscriber card identification number and the telephone number of the subscriber card 3 supplied to the vehicle production works 10 and to be installed in the telematics controller 2 there are provided via an ISDN line from

the supplier's database 21.

The dealer who is selling or leasing the vehicle 1 with the telematics service provides the telematics center with data from a database 41 identifying the keeper of the vehicle 1 in more detail. This data, for example the name, address and vehicle identification of the customer, is normally created when the vehicle 1 is handed over to the dealer's customer. Data such as this which allows individual supervision of a subscriber to the telematics service, is already available in any case, without any additional effort, and is transferred from the dealer's database 41 via an ISDN line to the telematics center 30.

The data which is provided from the dealer's database 41 results in a particularly convenient "personalized telematics service". However, the telematics service is fully functional as an "non-personalized telematics service" even without the data provided from the database 41. For example, an "emergency call" telematics service is provided as a "personalized telematics service" with a message in the form "Herr Meier in his S500 with the vehicle license number S- MB 500 at the location X has initiated an emergency call". As a "non-personalized telematics service", the emergency call is made with a message in the form "S500 vehicle at the location X has initiated an emergency call". If the subscriber changes, for example when the vehicle 1 is sold, the data provided from the database 41 in the telematics center 30 is deleted, thus resulting once again in an "unpersonalized telematics service", until the telematics center 30 has been provided with new customer data.

After reception of the data that has been provided, the automated authorization process starts in the telematics center 30. During this process, a billing

account for the telematics service is opened up, for example, in a manner known per se. During this process, the billing account is associated with the vehicle 1. This avoids complex creditworthiness checks, since the vehicle manufacturer represents a solvent contract partner. The telematics service is thus fully functional on completion of the motor vehicle 1 in the vehicle production works 10.

For the customer who is procuring the motor vehicle 1, there is therefore no need for the closure and, if required, extension of a mobile radio contract and an additional contract with the telematics service provider. He procures the motor vehicle 1 with the telematics service as a fully functional, integral component. Even when the customer sells the motor vehicle 1 for the first time, the telematics service remains fully operational.